

## CLAIMS

What is claimed is:

1. A system for determining a repairable semiconductor device of a plurality of semiconductor devices comprising:  
testing apparatus for performing a test of a first type on a semiconductor device for identifying types of failures in the semiconductor device, the testing apparatus including a support for supporting a semiconductor device under test of said plurality of semiconductor devices;  
processing circuitry for communicating with the testing apparatus for determining a type of failure of a number of the identified types of failures, the processing circuitry providing at least one signal indicative of the at least one type of failure; and  
decision circuitry for receiving the at least one signal indicative of the at least one type of failure of the types of failures for considering the at least one type of failure of the identified types of failures in one of for designating the at least one semiconductor device for an additional procedure, for designating the at least one semiconductor device for repair, and for designating the at least one semiconductor device for additional tests of the first type, the decision circuitry for designating the at least one semiconductor device for the additional procedure when the at least one type of failure of the identified types of failures is within a first number set, designating the at least one semiconductor device for repair if the number of the identified types of failures is within a second number set, and determining when the at least one semiconductor device is repairable.
2. The system of claim 1, wherein the decision circuitry designates the at least one semiconductor device for the additional tests of the first type if the identified types of failures is within a third number set.
3. The system of claim 2, wherein the first number set includes only zero, the second number set includes numbers greater than zero and less than a threshold, and the third number set includes numbers equal to or greater than the threshold.

4. The system of claim 2, wherein the at least one semiconductor device is rejected when the identified types of failures is within the second number set and the at least one semiconductor device is not repairable.

5. The system of claim 1, wherein the processing circuitry is located one of proximate to the testing apparatus and remote from the testing apparatus.

6. The system of claim 1, further comprising:  
a pass bin into which the at least one semiconductor device is relocated if the at least one semiconductor device is designated for the additional procedure; and  
a repair bin into which the at least one semiconductor device is relocated if the at least one semiconductor device is designated for repair.

7. The system of claim 6, further comprising:  
a reject bin into which the at least one semiconductor device is relocated is determined to be nonrepairable.

8. The system of claim 1, further comprising:  
a system controller including the decision circuitry; and  
a repair station controlled by the decision circuitry of the system controller.

9. The system of claim 1, further comprising:  
a repair station, and wherein subsequent to the decision circuitry designating the at least one semiconductor device for repair, the decision circuitry determines whether the at least one semiconductor device is repairable and, if the at least one semiconductor device is repairable, the repair station repairs the at least one semiconductor device.

10. The system of claim 1, wherein the testing apparatus includes repair circuitry for performing a repair on the at least one semiconductor device when the at least one semiconductor device is designated for repair and is determined to be repairable.

11. The system of claim 1, wherein the at least one semiconductor device is binned based upon the number of the identified types of failures.

12. The system of claim 1, wherein the identified types of failures include failures of different classes in which the identified types of failures is a number of total failures of all classes, and the decision circuitry considers failures of different classes in determining whether to designate the at least one semiconductor device for the additional procedure, designate the at least one semiconductor device for repair, or perform the additional tests of the first type.

13. The system of claim 1, wherein the tests of the first type detect certain defects in the at least one semiconductor device which are not classified as examples of the identified types of failures and, therefore, do not contribute to the number of the identified types of failures.

14. The system of claim 1, wherein the additional procedure includes transporting the at least one semiconductor device to a predetermined location.

15. The system of claim 1, further comprising at least one of:  
a first temperature-regulated chamber in which tests of the first type are performed; and  
a second temperature-regulated chamber in which the additional procedure is performed.

16. The system of claim 1, wherein the testing apparatus includes probes, and electrical connection is made between the probes and the at least one semiconductor device.

17. The system of claim 2, wherein the at least one semiconductor device includes leads and the support includes sockets for receiving the leads, an electrical connection for connecting between the testing apparatus and the sockets.

18. The system of claim 1, wherein tests of the first type include: subjecting the at least one semiconductor device to various temperatures in a first range of temperatures while monitoring electrical signals on the at least one semiconductor device; and the additional procedure includes subjecting the at least one semiconductor device to various temperatures in a second range of temperatures while monitoring the electrical signals on the at least one semiconductor device.

19. The system of claim 1, wherein the at least one semiconductor device comprises one of a chip in wafer form and a package and leads.

20. The system of claim 2, wherein the additional tests of the first type are performed, failures in the at least one semiconductor device are re-identified and a number of re-identified types of failures are determined, with the decision circuitry subsequently: designating the at least one semiconductor device for the additional procedure when the number of the re-identified types of failures is within a fourth number set; designating the at least one semiconductor device for repair when the number of the re-identified types of failures is within a fifth number set; and designating the at least one semiconductor device for the additional tests of the first type when the number of the re-identified types of failures is within a sixth number set; repeating such designations by the decision circuitry until alternately the number of the re-identified types of failures is within the fourth number set, the at least one semiconductor device is repairable and the number of the re-identified types of failures is within the fifth number set, or the additional tests of the first type have been performed a

predetermined number of times and the number of the re-identified types of failures is within the sixth number set.

21. The system of claim 20, wherein the additional procedure designated by the decision circuitry includes:

- designating the at least one semiconductor device for tests of a second type to the re-identify types of failures in the at least one semiconductor device and determine the number of re-identified types of failures;
- designating the at least one semiconductor device for a further procedure when the number of the re-identified types of failures is within a seventh number set;
- designating the at least one semiconductor device for repair when the number of the re-identified types of failures is within an eighth number set; and
- the testing apparatus performing additional tests of the second type on the at least one semiconductor device when the number of the re-identified types of failures is within a ninth number set.

22. The system of claim 1, wherein the decision circuitry includes:

- a testing controller to control tests of the first type; and
- a data analyzer receiving data from the at least one test of the first type and determining one of
  - designating the at least one semiconductor device for the additional procedure,
  - designating the at least one semiconductor device for repair, and performing the additional tests of the first type on the at least one semiconductor device.